

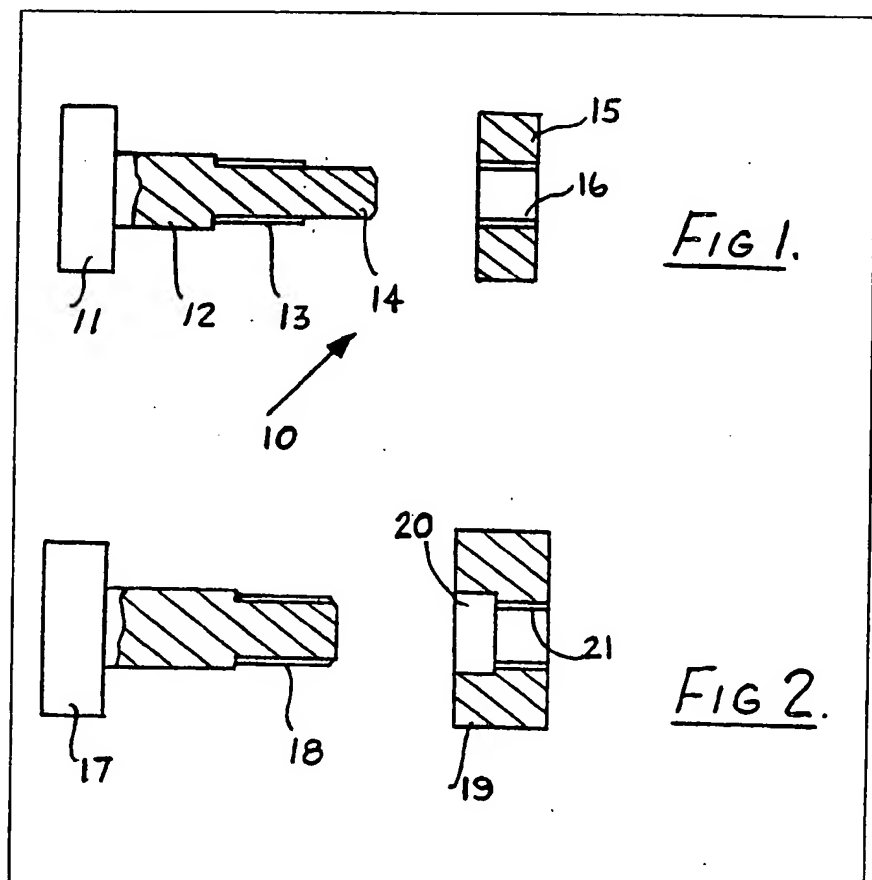
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(54) Aligning screw threaded fasteners

(57) A screw threaded fastening member, such as a bolt (Fig. 1) is arranged with a portion 14 unthreaded and of the minor thread diameter so as to allow a threaded nut 15 to slide along the unthreaded

portion 14 and align the axes of the members prior to engagement of the threaded portions 13, 16 so that subsequent relative rotation causes conventional threaded engagement between them. In an alternative embodiment (Fig. 2) a nut 19 has an unthreaded part arranged to slide along a threaded bolt shank to align the threaded portions.



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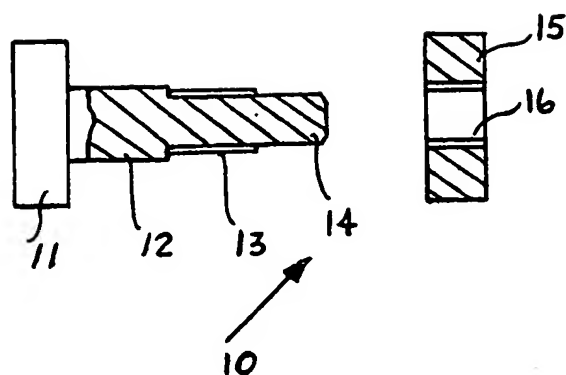


FIG 1.

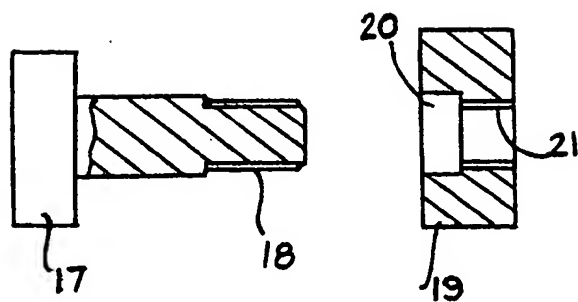


FIG 2.

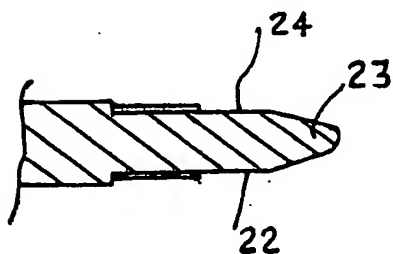


FIG 3.

SPECIFICATION

Threaded fastening member

This invention relates to threaded male and female fastening members such as bolts and nuts and in particular to constructions of such members to facilitate co-operative engagement of the threads.

When working in difficult environments, such as underwater, difficulty is found in simple manual tasks such as engaging threaded nut and bolt members in view of the difficulty in gaining visual alignment of the members. Where the underwater environment is particularly hostile such tasks are made more difficult by the wearing of bulky protective clothing. Machines have been developed to perform such tasks but such machines are of a comparatively crude nature and insensitive to misalignment between threaded members, leading frequently to cross-threading which is not readily detectable but may leave the assembly dangerously weakened.

It is an object of the present invention to provide a screw threaded male or female fastening member which mitigates the problems associated with the above outlined assembly methods.

According to one aspect of the present invention a screw threaded male or female fastening member arranged for threaded engagement with a co-operating threaded member has a part of a co-operating surface unthreaded and able to slide axially relative to the threaded portion of such a co-operating member to align the members axially prior to engagement of the threads so that subsequent rotation of the members relative to each other about the alignment axis causes conventional threaded engagement of the members.

The unthreaded part may be tapered for part of its length to facilitate initial alignment.

Preferably the member is a male member, such as a bolt, having the end of the shank unthreaded and of the minor thread diameter of the shank to enable it to slide through a threaded female member substantially without radial movement.

The unthreaded part of the shank may extend for any length and be longer than the threaded length of a female member to be used with the male member but conveniently the unthreaded part is of the order of half the threaded length of the female member.

According to another aspect of the present invention a combination of screw threaded male and female fastening members has a part of one of the co-operating surfaces unthreaded and able to slide axially relative to the threaded portion of the other member to align the members axially prior to engagement of the threads so that subsequent rotation of the members relative to each other about the alignment axis causes conventional threaded engagement of the members.

Embodiments of the invention will now be described by way of example with reference to the accompanying drawings, in which:—

Figure 1 is a sectional elevation through a threaded bolt according to the present invention showing it in axial alignment with a correspondingly threaded nut,

Figure 2 is a sectional elevation through a threaded nut according to the present invention showing it in axial alignment with a correspondingly threaded bolt, and

Figure 3 is a sectional elevation through a portion of a bolt similar to Figure 1 showing a tapered end to the shank.

Referring to Figure 1 a combination of screw threaded male and female fastening members, namely a nut and bolt combination 10 comprises a threaded bolt having a conventional head 11, plain shank 12 and threaded shank 13. The end part 14 of the shank remote from the head is formed of a diameter corresponding to the minor diameter of the threaded portion 13 such that a nut 15 having an internal thread 16 corresponding to that 13 is able to be slid over the part 14 prior to engagement of the threaded portions. The unthreaded part 14 may be of any length but is conveniently half the thickness of thread length of the nut and serves to align the nut and bolt members axially such that rotation of the nut relative to the bolt causes conventional threaded engagement between them.

Referring to Figure 2 this shows a conventional bolt 17 in which the threaded portion 18 of the shank extends to the end thereof. A nut 19 formed according to the present invention has a part 20 of internal diameter equal to the major thread diameter of the bolt while the remainder 21 is threaded to correspond to the bolt thread 18. It will be appreciated that as the nut is pushed over the end of the bolt, or the bolt inserted into the nut, the unthreaded portion permits axial sliding between the members and alignment of their threads ready for conventional rotational attachment when the threads engage. With this second described embodiment, in which the nut carries the unthreaded part, the nut will in general have to be made thicker to contain in the same length of thread, but this form is suited for replacing or existing bolts or studs which may not be replaceable.

It will be appreciated that the nut and bolt combinations described above are suited for assembly by machine. The nut may be rotated by machine and may be slide onto the bolt while being rotated such that as soon as the threads engage tightening takes place.

Figure 3 shows a modification to the bolt shown in Figure 1 which may be employed to ease initial location. The end portion of the unthreaded part 22 is tapered at 23 to enable a preliminary engagement with a nut prior to final alignment by the parallel sided part 24. Initial location of a bolt, with or without the taper of Figure 3, may be aided by forming the shank with a radiused or spherical end. Alternatively a nut arrangement such as shown in Figure 2 may have a chamfered edge to the unthreaded recess 20.

It will be appreciated that the above description

which has related to nut and bolt assembly may be applied equally to any screw threaded male or female fastening members, such as studs or tapered holes.

5 CLAIMS

1. A screw threaded male or female fastening member arranged for threaded engagement with a co-operating threaded member has a part of a co-operating surface unthreaded and able to slide axially relative to the threaded portion of such a co-operating member to align the members axially prior to engagement of the threads so that subsequent rotation of the members relative to each other about the alignment axis causes conventional threaded engagement of the members.
2. A fastening member as claimed in claim 1 in which the unthreaded part is tapered for part of its length to facilitate initial alignment.
3. A fastening member as claimed in claim 1 or claim 2 in which the member is a male member, having the end of the shank unthreaded and of the minor thread diameter of the shank to enable it to slide through a threaded female member substantially without radial movement.
4. A fastening member as claimed in claim 3 in

which the member is a bolt.

5. A fastening member is claimed in claim 3 or claim 4 in which the unthreaded part extends for half the threaded length of a conventional threaded female member used therewith.

6. A male or female screw threaded fastening member substantially as herein described with reference to Figures 1, 2 or 3 of the accompanying drawings.

7. A combination of screw threaded male and female fastening members having a part of one of the co-operating surfaces unthreaded and able to slide axially relative to the threaded portion of the other member to align the members axially prior to engagement of the threads so that subsequent rotation of the members relative to each other about the alignment axis causes conventional threaded engagement of the members.

8. A combination as claimed in claim 7 in which a part of the co-operating surface of the male fastening member is unthreaded and of diameter equal to the minor diameter of the threaded portion.

9. A combination of screw threaded male and female fastening members substantially as herein described with reference to and as shown in Figure 1 or Figure 2 of the accompanying drawings.

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